MR-5 Explosive & Ordnance Disposal Robot

Art.Nr. 0100100

MR5 - Features

The MR-5 is a new generation of Explosive & Ordnance Disposal Robots (EODR).
It provides excellent precision and dexterity.

MR-5 is the medium size of MR series.

Police, Military, ERT, Fire, Nuclear, and other Hazardous Response personnel can utilize the multipurpose MR-5. The MR-5 could be used for surveillance, reconnaissance, handling of hazardous items, manipulation of suspected packages, neutralizing and handling such items as Improvised Explosive Devices (IED's), Hazardous Chemicals, and Radioactive Materials.

MR-5 is an all-weather all-terrain mobile robot for indoor (buildings, public institutions, airports, homes, etc.) and outdoor environments (terrain cluttered with obstacles, ditches, gravel, snow, mud, etc.). MR-5 is based on latest robotic and computer technologies for hazardous environment operations. MR-5 is remotely controlled, and consists of a robust platform, a dexterous robot arm, operator control station, communication links, and a variety of operational tools and accessories.

MR-5 has special features: quick-removable tracks, quick-removable articulated wheels in front and back for better stability on stairs and slopes, precise independent joint control, long reach, high payload, and expandable to autonomous navigation.

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Platform & Mobility
MR-5 is equipped with 6 wheels, a set of removable tracks, and a set of removable articulated wheels. The tracks are used for rough terrain and stair or slope climbing. The articulated wheels are used for climbing high obstacles and high slope stairs. The robot is able to turn-on-the-spot and manoeuvre precisely in an obstacle-cluttered area. The drives also features a drive-hub, which can disconnect the drive from the wheels to facilitate manhandling of the robot if necessary. The wheel/track system is very reliable for the very rough terrain.

Communication Systems
MR-5 is remotely controlled by a wireless radio link; alternatively, an on-board automatic winding cable system, or an independent reeled cable system can be used. 2-way data & audio and 1-way video links are available. Up to 4 cameras and a microphone provide the operator with images and sounds of the environment. The surveillance camera can be mounted on the arm (low to the ground, high in the air, close or far from the gripper) or on an articulated boom (usually positioned vertically) to provide excellent views.

Wrist/Gripper
The MR-5 arm can be configured to perform desired operations: aiming and firing disrupters, pushing heavy payloads, reaching under cars or through car windows, breaking windows, etc. The robot can insert a car key to open car doors, manipulate sensory devices for inspection and surveillance, and handle delicate or hazardous materials. A force controlled high quality gripper provides dexterous handling capability. Various grippers can be attached to fit specific operations, payloads and tasks.

Environment
MR-5 is water resistant, and all exposed surfaces are covered with anodizing or protective paint. All detector and electronics compartments are protected against water and contaminants. Operates in all types of weather conditions, day and night, and various types of wet and dry surfaces. Operational temperature range is from –20 to +45°C. Environmental humidity can be up to 95% at 25°C. Storage temperature range is from 0 to 45°C.

MR-5 Specifications

MR-5 is suitable for operating indoor (buildings, homes, airports, train station) and outdoor (urban settings, rough terrains in obstacle cluttered environments, ditches, stairs, mud, gravel, etc.) The wheel/track system is very reliable. The tracks are mounted around the wheels so that the contact between wheels and tracks prevent damage or run-away of tracks when pieces of stone or gravel enter between the wheel and the track. The tracks are extremely durable due to a heavy-duty design and strength. An operator can dismount the tracks in a few minutes, and use only wheels when there is no need to climb over obstacles or up/down the stairs. A pair of articulated wheels prevents rollover while climbing or descending stairs, and help mounting high or wide obstacles

MR-5 can be used with weapons and tools for neutralization of improvised explosive devices, handling of explosive materials, suspicious parcels, and inspection of trapped vehicles.

MR-5 robot arm is unique in the sense that it provides servo-precision motion allowing the operator to approach to handle or hit a target with sub-millimeter accuracy. The operator can control several joints at once allowing the end-effector (gripper, weapon, tool) to move in any desired direction. The MR-5 is rugged as well as precise; it is capable of carrying very large and very small payloads with same gripper and same dexterity:

MR-5 manipulator couls have 7 joints:
turret, shoulder, elbow, wrist base, linear extension, and wrist roll. Various accessories can be attached to the arm. The tools and modules are quickconnected/disconnect units.

The MR-5 consists of:
Platform, Manipulator arm, Wrist, Gripper, Cameras, Control Station, Communication (cable and wireless) with Video and Audio links, and Accessories (Disrupters, XRay, Shotguns and Window breaker, etc.).

Dimensions

Width 70cm (27.5in) / Length 127cm (50in) / Height 79cm (31in)

Weight

Standard configuration 250kG (550lb); with accessories 300kg (660lb)

Climbing Ability

45° stairs or slopes with tracks

Tracks can be installed and removed within a few minutes by one person

Obstacle height: 300mm (11.8in) / Obstacle width: 300mm (11.82in)

Maneuverability

360° turns in a 1.4m (55in) circle / allows turning while driving;

Precise speedcontrol for each joint

incremental motion of each joint allows 1 – 5mm

Speed

0 - .56 m/s (0 – 22 in/s)

0 – 2.0 km/h, higher speed possible with geared transmission

Operating Range

Wireless RF 500m (1640ft) open-area / 200m urban

Onboard fiber-optic or coaxial cable 200m (656ft)

Duration of Mission

3 – 5- hours

Tool Kit and Battery Charger

Various tools for robot maintenance / Battery charger is a smartcharger, it recharges battery pack in 3 hours

Operating & User Manual

Reach

Vertical: 2,5m (98 in) From ground (Standard configuration)

Horizontal: 1.75m (69 in) From front edge of platform (Standard)

Lift Capacity

25 kg (55 lb) with arm fully extended / 120 kg (264 lb) above edge of platform

Weapons / Tools

Disrupter mount and disrupter
Shotgun mount assembly and shotgun
X-ray mount assembly and x-ray unit
Window breaker assembly
Charge drop reel assembly
Other accessories by inquiring at **EODPartner**
Firing circuits (0/24VDC with safety switch and timer delay): 2 on arm, 2 on vehicle
Relay circuits (open/close, 24VDC): 2 on arm, 2 on vehicle

Communication

Wireless link (2-way Data and Audio, 1-way Video)
on-board fiberoptic or Coaxial Cable Automatic Winding

Environmental

Operates in all types of weather conditions, day and night, and various types of wet and dry surfaces
Operational temperature range from –20 to +45°C
Luftfeuchtigkeit bis zu 95% bei 25°C
Environmental humidity up tp 95% at 25°C
Storage temperature range from 0 to 45°C;
Weatherproof

Modules

Vehicle / Turret / Arm (Shoulder, Elbow) / Wrist (Base, Pitch, Roll) / Linear Extension / Gripper / Cameras / Cable & Wireless RF Communication / Control Station / Accessories such as Disrupter and various other attachments, etc.

Arm Configuration Manipulator is a 2 to 7-axis robot with the following joints

Turret	Rotate the arm about vertical axis
Shoulder	Rotate the arm about horizontal axis
Elbow	Additional rotation about the horizontal axis
Wrist base	First wrist rotation
Wrist tilt (pitch)	Second wrist rotation axis
Linear extension	Linear extension between pitch and roll
Wrist roll	Third wrist rotation axis

MR-5 Options

Articulated Wheels	Two 2-wheel frames connected to back and front panels of the platform; rotates Up: to 90° and Down: to 45°
Turret	Rotation (-120° to 180°)
Wrist Base Rotate	Roll joint (+/- 100°)
Wrist Pitch (Tilt)	Tilt joint (+/- 100°)
Linear Extension	Linear joint extending 150mm
Heavy-Duty Gripper	For extreme ruggedness
Gripper Camera	Color / Wide angle / Auto iris
Extension Arm	For Surveillance Camera 600mm
Infrared Camera	Enhanced low-light vision; Small weatherproof IR-sensitive camera with LED illumination; For 10ft in total darkness; External illumination unit can be added for longer distance
On-Board Cable Winding System	Mounted on vehicle; Free wheel unwind and automatic rewind; Fiber-optics or coaxial cable; length 200m (656 ft)
Wireless RF Communication Link	500m (1640ft) open area / 200m urban; 2-way data and audio / 1-way video

MR-5 Accessories

Disrupter Mount	Dual mount with quick-connect mechanism / Manually adjustable tilt angle
Disrupter Aiming & Firing System	Precision pan and tilt unit / Direct laser aiming / Resolution: +/- 0.5mm at 3m (+/- 0.02in at 10ft)
Disrupters	Proparm products or user selection
Shotgun Mount	
Laser Assembly	High power laser-pointer assembly (visible in bright sunshine); for disrupter pr shotgun mounts
Shotgun	12 gauge Franchi or user selection
Laser Range Finder	Distance measurement to 30m (100ft) / Accuracy 3mm (1/8 in)
X-ray Mount	X-ray system mount with quick connect mechanism
X-ray Equipment	Golden XR200 or user selection
Window Breaker Assemly	Held by gripper / used to break windows in cars, walls, and doors
Charge Drop Reel Assmebly	Low friction reel that can lay down 15m (50ft) of wire
Other Accessories	B y inquiring at **EODPartner**

The professional manipulator for EOD / IED specialists

- Precise movement provided by a zero-backlash manipulator arm with 7 articulated infinite-position joints
- The MR5 offers (2) 300:1 zoom auto focus/auto iris and (2) fixed-focus (one is re-locatable) cameras
- Near Infrared light/camera kit available
- Innovative wrist, pitch, and extender assembly offers virtually no play at full extension
- Rapidly deployable due to switchable integrated RF and fiber-optic communication links
- Elbow and shoulder with built-in turret are capable of lifting up to 130kg near the MR5's front edge
- Driving lights positioned for proper night time operation
- Capable of using popular LVIEDD accessories

- Tracks allow robot to climb 45° stairs and travel on any terrain. They are easily and quickly removed or installed.
- Remotely listen and speak with two-way audio and built-in microphone and loudspeaker
- On-board system diagnostics
- Independently controlled surveillance arm

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Sensors integrated into robot's control system with switchable real-time onscreen display for optimal situational awareness

Onboard system diagnostics with realtime onscreen display for immediate corrective action

Infinite-position joysticks provide precise and smooth vehicle and arm joint control

All joysticks can be recalibrated quickly on site by user without additional tools

Firing circuits meet U.S. military safety standards for operator safety and prevention of accidential discharge

Large 15" daylight-readable LCD monitor for excellent Image readability

Monitor panel possesses front panel A/V recording jacks for convenience

RF and fiber optic communication links provide two-way audio and data and one-way video

If cut, the fiber optic communication link can automatically switch to RF mode for un-interrupted mission accomplishment

Control station has an integrated extended-life battery and radio for rapid deployment and redeployment

Battery life of OCU and robot meet or exceed most mission requirements

Both the robot and the control station are weatherproof to IPX5 standards and can easily decontaminated

MR-5 Standard Configuration

Operator Control Station

Portable / Enclosed in a weatherproof enclosure

Control panel with joysticks and switches to control all robot functions

Colour LCD monitor (diagonal 15“ = 38 cm)

VCR connectors (for an external VCR or TV monitor)

Operates at 12 VDC or 110/220 VAC

2-way audio communication (microphone and 8-W speakers on the vehicle and at operator control station or headset

Video Display

Camera images (4) picture-in picture / Battery status / Diagnostic messages

Platform

Six-wheel drive for all terrain with two 24 V or 48 V drive motors controlled by highquality servo drivers; Optional: Articulated wheels (up 90 down 45) mounted on the back and front panels for added stability on ascent or descent of stairs and manoeuvrability over obstacles;

Light: Halogen - two 20 W lights on front of platform, one 20 W on the Surveillance Camera;

Speaker and Microphone

Battery pack: 24 V or 48 V removable with four Gel-Cell batteries / 64 Ah / Battery duration 3-5 hrs / On-board charging / Battery charger supplied

Tracks

For stair climbing, steep slopes, and rough terrain; mounted over the rubber wheels; can be removed and installed in 4 minutes.

On-Board Electronics

The on-board electronics and computer is based on the latest generation of Intel Pentium processors and stack of PC/104 boards for controlling the platform, arm, and communication. The electronics is very rugged and capable of withstanding all-terrain operation in out-door environments

Arm

Shoulder or back-arm allows rotation of the arm in vertical plane (215) / Elbow or forearm (260) / Forearm is used to attach interchangeable modules (Wrist & Gripper, Cameras, and Accessories etc).

Wrist Roll

Roll joint (+/- 100°)

Gripper

Standard gripper up to 12 in (0.3 m) fully open / Proportional gripping force / Max. gripping force 36 Kgf (80 lbf)

Arm (Relocatable) Camera

Color / Wide-angle lens / Auto iris.

Surveillance Camera & Extension:

Color CCD / Remote zoom (72:1) / Remote focus / Auto iris / Pan +/- 170 0 / Tilt +/- 170 0
Optional: Extension parallelogram arm: 60 cm.

Drive Camera

Color / Wide-angle lens / Auto iris

Cable Reel

656 ft (200 m) of standard cable on a reel assembly / Free wheel unwind and manual rewind

MR-5 Configuration "A"

Six wheeled, removable track
Remote vehicle assembly
PC104 technology
On board system diagnostics
Modular construction
Easy maintenance
Seven degrees of freedom precision movement arm with zero backlash that includes Turret, Rotate, Shoulder, Elbow, Wrist Pivot, Wrist Rotate, Wrist Extend & Gripper
Wide Angle, fixed focus lens color drive camera, 300 : 1 optical/digital zoom color gripper camera, 300:1 optical/digital zoom or color surveillance camera with pan and tilt, surveillance camera extender that raises the PTZ camera
4th/relocatable camera option
2-way audio
8 relay circuits
8 firing circuits with redundant safety feature
48VDC battery pack (with current sensor) in vehicle with external charger
all cables with 1/4 turn connectors
Tool kit
Operation/Maintenance Manual
Two Year warranty
Table Top Controller Assembly, powder coated weatherproof enclosure (21.25" wide x 14,25" deep x 10.375" high)
Control panel has a 15 inch self-compensating daylight readable LCD monitor with Quad View option to view 4 cameras
Control station has joysticks for infinitely precise control of drive and manipulator joints
12VDC battery and charger
Hand Controller Assembly

Fiber Optic Communication Option –
Cable reel with1200 ft of fiber optic cable with electric, guided rewind

MR-5 Configuration "B"

Six wheeled, removable track
Remote vehicle assembly
PC104 technology
On board system diagnostics
Modular construction
Easy maintenance
Seven degrees of freedom precision movement arm with zero backlash that includes Turret, Rotate, Shoulder, Elbow, Wrist Pivot, Wrist Rotate, Wrist Extend & Gripper
Wide Angle, fixed focus lens color drive camera, 300 : 1 optical/digital zoom color gripper camera, 300:1 optical/digital zoom or color surveillance camera with pan and tilt, surveillance camera extender that raises the PTZ camera
4th/relocatable camera option
2-way audio
8 relay circuits
8 firing circuits with redundant safety feature
48VDC battery pack (with current sensor) in vehicle with external charger
all cables with 1/4 turn connectors
Tool kit
Operation/Maintenance Manual
Two Year warranty
Table Top Controller Assembly, powder coated weatherproof enclosure (21.25" wide x 14,25" deep x 10.375" high)
Control panel has a 15 inch self-compensating daylight readable LCD monitor with Quad View option to view 4 cameras
Control station has joysticks for infinitely precise control of drive and manipulator joints
12VDC battery and charger
Hand Controller Assembly

Wireless Communication Option –
Radio with 5 Watt video system + 2-way audio

MR-5 Konfiguration "C"

Six wheeled, removable track
Remote vehicle assembly
PC104 technology
On board system diagnostics
Modular construction
Easy maintenance
Seven degrees of freedom precision movement arm with zero backlash that includes Turret, Rotate, Shoulder, Elbow, Wrist Pivot, Wrist Rotate, Wrist Extend & Gripper
Wide Angle, fixed focus lens color drive camera, 300 : 1 optical/digital zoom color gripper camera, 300:1 optical/digital zoom or color surveillance camera with pan and tilt, surveillance camera extender that raises the PTZ camera
4th/relocatable camera option
2-way audio
8 relay circuits
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48VDC battery pack (with current sensor) in vehicle with external charger
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Operation/Maintenance Manual
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Control station has joysticks for infinitely precise control of drive and manipulator joints
12VDC battery and charger
Hand Controller Assembly
Fiber Optic Communication Option – Cable reel with1200 ft of fiber optic cable with electric, guided rewind
Wireless Communication Option – Radio with 5 Watt video system + 2-way audio
Redundant Communication Option